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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Kamal Shah

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EXAMINER

THOMPSON, JASON

ART UNIT

PAPER NUMBER

3785

NOTIFICATION DATE

DELIVERY MODE

10/13/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,970	<b>Applicant(s)</b> SHAH, KAMAL	
	<b>Examiner</b> JASON THOMPSON	<b>Art Unit</b> 3785	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08/06/2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 5) ☒ Claim(s) 1-25 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1-25 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 13 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

This is in response to the amendment filed 5/3/2011

### ***Double Patenting***

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to

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be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**2. Claims 1-3, 8, 11, 12, 14, 17-21, and 23-25 are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 8, 13, 14, and 20 of copending Application No. 11/868,155 (‘155 application) and further in view of Wilkinson (US 2003/0005722). This is a provisional obviousness-type double patenting rejection.**

Regarding claims 1, 17 and 24, claims 1 and 13 of the ‘155 application claims all of the elements of the instant invention, with the exception of specifically pumping a reflux portion of condensed overhead product to the top of a fractionation unit (or a pump or a means for pumping). Claim 1 of the ‘155 application merely recites “directing” a reflux stream.

Wilkinson teaches a pump (23) for directing a reflux stream of overhead product to the top of a fractionation unit (Paragraph 66). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have added a pump as disclosed by Wilkinson in combination with the method and apparatus as claimed by the

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'155 application (11/868,155) in order to take advantage of well known means of directing streams of fluid.

Regarding claim 2, claim 2 of the copending patent application (11/868,155) discloses all the limitations.

Regarding claim 3, claim 1 of the copending patent application (11/868,155) teaches recovery of petroleum gas or natural gas liquids from LNG, however the claim does not specify hydrocarbon size.

Wilkinson teaches processing of natural gas liquids composed of hydrocarbons with up to and including 3 carbons (Paragraph 5). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention that the method as claimed by the '155 application would have been applied to a rich gas stream containing C<sub>2+</sub> hydrocarbons as taught by Wilkinson since Wilkinson teaches this to be a typical analysis of a process stream.

Regarding claim 8, claim 1 of the co-pending patent application (11/868,155) discloses all the limitations.

Regarding claim 11, claim 1 of the co-pending patent application (11/868,155) discloses all the limitations.

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Regarding claim 12, claim 1 of the co-pending patent application (11/868,155) discloses a bottom product stream but does not explicitly claim if it is substantially liquid.

Wilkinson teaches a bottom product (44) that is composed substantially of natural gas liquids (Paragraph 66). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have used a substantially liquid bottom product stream as taught by Wilkinson in combination with the method as claimed by the `155 application, to improve the separation process.

Regarding claim 14, claim 1 of the co-pending patent application (11/868,155) discloses a bottom product stream but does not indicate its temperature after exiting the fractionation unit.

Wilkinson teaches the liquid product stream (41) at the bottom of the fractionation tower as 115F (Paragraph 37). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have modified the method as claimed by the `155 application to include an exit temperature of the bottom product stream, as taught by Wilkinson, to improve the separation process.

Regarding claim 18, claim 14 of the copending patent application (11/868,155) discloses all the limitations.

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Regarding claim 19, claim 13 of the co-pending patent application (11/868,155) discloses a fractionation unit, but does not indicate the number of trays, packed columns, or combinations thereof.

Wilkinson discloses a fractionation tower (19) that contains a plurality of vertically spaced trays, packed beds or a combination thereof (Paragraph 37). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have provided the apparatus of claim 1 of the `155 application with the specific number of trays, packed columns, or combinations thereof, as disclosed by Wilkinson, to improve the separation process.

Regarding claim 20, claim 13 of the co-pending patent application (11/868,155) discloses all the limitations with the exception of the separation of ethane, propane, and heavier components from methane.

Wilkinson discloses a LNG conditioning apparatus that liquefies and separates a stream of LNG with components heavier than methane (Paragraph 5). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have used the apparatus of the `155 application to separate ethane, propane, and heavier components from methane, as disclosed by Wilkinson, since Wilkinson teaches this to be a common use of this type of apparatus.

Regarding claim 21, claim 20 of the copending patent application (11/868,155) discloses all the limitations.

Regarding claim 23, claim 12 of the copending patent application (11/868,155) discloses all the limitations.

Regarding claim 25, claim 14 of the copending patent application (11/868,155) discloses all the limitations.

**3. Claims 5, 7, 9, and 13 are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 8, 13, 14, and 20 of copending Application No. 11/868,155 ('155 application), Wilkinson (US 2003/0005722), and further in view of Stone (US 6,510,706). This is a provisional obviousness-type double patenting rejection.**

Regarding claim 5, claim 1 of the co-pending patent application (11/868,155) discloses heating of a direct stream in a cross-exchanger, but the reference does not indicate the temperature of the LNG stream at this point.

Stone teaches a process for recovering NGL where a direct stream (10) is heated in a cross exchanger (13) where the temperature of said stream is increased from -139F to -101.2F (Column 4, table 2) in the process of condensing an overhead product stream (Col. 3, lines 3-5). While the heated temperature does not fall precisely within the range claimed by applicant, the general conditions disclosed by the reference occur within 14 degrees Fahrenheit. As a result, it would have been obvious to one of



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ordinary skill in the art, at the time of applicant's invention to have modified the method as claimed by the `155 application to include a cross-exchanger temperature of the overhead product stream, as taught by Stone, since the claimed values are merely an optimum or workable range. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 7 and 13, claims 1 and 7 of the co-pending patent application (11/868,155) discloses an overhead product stream and a range for fractionation unit operating pressures. However, operating temperatures of the overhead product are not indicated.

Stone teaches a process for recovering NGL where an overhead product stream (20) exits a fractionation tower (15) with a temperature of -95.6F (Table 2) and said stream is subsequently cooled in a cross exchanger (13) by heating a direct stream (12), forming a cooled stream (21) with a temperature of -132.7F (Table 2). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention to have modified the method as claimed by the `155 application to include the operating temperatures as taught by Stone to produce a liquefied product stream.

Regarding claim 9, claim 1 of the co-pending patent application (11/868,155) discloses a primary column feed but does not indicate if it is substantially liquid.

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Stone teaches a process for recovering NGL where a primary column feed (22) is substantially liquid (Col. 3, lines 20-29). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to replace a primary feed column as claimed by the method of the '155 application, with the primary feed column as taught by Stone, to improve the separation process by providing cold reflux.

**4. Claims 4 and 22 are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over the combination of claim 1 of copending Application No. 11/868,155 ('155 application), Wilkinson (US 2003/0005722), and further view of Keller (U.S. Publication 2003/0005698).**

**This is a provisional obviousness-type double patenting rejection.**

Regarding claim 4, claim 1 of the co-pending patent application (11/868,155) teaches a liquefied natural gas stream, but claim 1 does not indicate the temperature of said stream.

Keller teaches a system for vaporizing LNG where the system inlet temperature is -249F (Paragraph 37). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to utilize an inlet temperature as taught by Keller in combination with the method as claimed by the '155 application to provide a feed stream of LNG having sufficiently low temperature.

Regarding claim 22, claim 1 of the co-pending patent application (11/868,155) teaches a reboiler, but claim 1 does not specify the type of reboiler used.

Keller teaches a submerged combustion vaporizer (SCV) as a reboiler. As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to replace the reboiler claimed by the method as claimed by the '155 application with a reboiler as taught by Keller to allow for improved separation in the fractionation unit.

**5. Claim 6 is provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/868,155 ('155 application), Wilkinson (US 2003/0005722), and further view of McCartney (U.S. Patent 6,564,579). This is a provisional obviousness-type double patenting rejection.**

Claim 1 of the co-pending patent application (11/868,155) teaches parameters discussing operating temperatures of an input stream, cross-exchangers, and vaporizer. However temperature ranges are not claimed.

McCartney teaches the use of heat exchangers for vaporizing LNG streams and heating said streams to a range between 30F and 50F (Column 5, lines 60-64). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to operate a vaporizer as claimed by the method of the '155

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application at the temperature range taught by McCartney, to produce a vapor that may be fractionated.

**6. Claims 10, 15, and 16 are provisionally rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/868,155 (`155 application), Wilkinson (US 2003/0005722), and further view of Rambo (US 5,114,451). This is a provisional obviousness-type double patenting rejection.**

Regarding claim 10, claim 1 of the co-pending patent application (11/868,155) teaches a vaporized secondary column, but does not indicate that said stream is preheated.

Rambo discloses a method and apparatus for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where it is optimal for said secondary column feed to be pre-heated (i.e. heated) prior to entering said fractionation tower such that the amount of fluid flowing down said tower is limited (Col 1, lines 63-69). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have modified the method as claimed by the `155 application to preheat a vaporized secondary column, to optimize inlet feed gas temperature.

Regarding claims 15 and 16, claims 1 and 13 of the co-pending patent application (11/868,155) teaches the heating of the inlet stream in addition to the

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cooling and condensation of overhead product stream, but does not explicitly disclose all of the limitations as claimed.

Rambo discloses a method and apparatus for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where the input stream is heated by absorbing heat from said overhead product stream (via cross exchanger 41 (Col 2, lines 10-16). As a result, it would have been obvious to one of ordinary skill in the art, at the time of the invention to have modified the method claimed by the `155 application to preheat an inlet stream of PLNG with an overhead product stream an overhead product stream as disclosed by Rambo to take advantage of cooling capacity.

### ***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 17, and 24, the limitation “at least a major portion” is indefinite as it does not clearly limit the scope of the invention. A major portion could constitute 51-100% of the overhead product stream. Said limitation occurs in lines 9 and 14 in each of the claims.

Regarding claims 2-16, 18-23, and 25 said claims are dependant on rejected independent claims.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**9. Claims 1-3, 8-12, 15-21, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rambo (US 5,114,451), and further in view of Zahn (US 4,142,876).**

Regarding claims 1, 2, 17, 18, 24, and 25, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas comprising, receiving an input/direct stream (21) comprising rich liquefied natural gas. However, the reference does not explicitly indicate splitting/diverting said direct stream into a direct stream and a bypass stream.

Zahn teaches bypass and mixing of LNG lines where a portion of natural gas is diverted via valve (76) to line (18) where it is mixed with an overhead product stream (4) to produce gas stream (5). As a result, would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a bypass line for

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mixing as taught by Zahn in combination with the LNG plant disclosed by Rambo to provide a means for system temperature control (Zahn, Col 4 line 56 to Col 5 line 7).

Further, Rambo discloses splitting said direct stream into primary (23) and secondary (26) feed columns where said feeds are subsequently heated in cross heat exchanger 41 and heat exchanger 12 to produce heated streams 24a and 27. While Rambo indicates heating of said streams after splitting, it would have been obvious to one having ordinary skill in the art at the time the invention was made to arrange a single cross exchanger upstream of a in order to heat a LNG stream by utilizing said stream's cooling capacity. It has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70;

Further, Rambo discloses vaporizing (Col 1 lines 63-68) said secondary column feed in a vaporizer (i.e. valve 14 is interchangeable with a turbo expander, Col 3 lines 51-61);

Fractionating a top feed (55), said primary column feed (23), and said secondary column feed (26) in a fractionation unit (15) to produce an overhead product stream (51 to 34) and a bottom product stream (32);

Condensing a portion of said overhead product stream by cooling said stream in said cross exchanger (41) to produce a condensed overhead product stream (54) and pumping (i.e. pressurizing using compressor 40) a reflux portion of said condensed overhead product stream to the fractionation unit as a top feed. Although the overhead product stream (51) is separated into a final product pathway (34) and reflux pathway (52) prior to condensing in cross exchanger (41), it would have been obvious to one

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having ordinary skill in the art at the time the invention was made to condense the overhead product stream in a cross exchanger before drawing a reflux portion from said condensed overhead stream as a top feed to improve recovery efficiencies. It has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70;

Vaporizing said output stream (i.e. stream 51 exits the top of said fractionation unit as a vapor), where the output stream is compressed, then heated to produce a conditioned natural gas (Col 2 lines 35-40).

Regarding claims 3 and 20, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where said system processes natural gas liquids composed of C 2+ hydrocarbons (i.e. separation of ethane, ethylene, propane, etc, disclosed in the abstract), such that methane and lighter components exit as an overhead product (Col 2, lines 35-40) and said heavier components exit as a bottom product (Col 2, lines 28-32).

Regarding claim 8, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where said reflux portion is substantially liquid (Col 2, lines 45-51).



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Regarding claim 9, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where said primary feed column is substantially liquid (Col. 1, lines 58-68: LNG stream 22 is split into primary and secondary LNG streams).

Regarding claim 10, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where it is optimal for said secondary column feed to be pre-heated (i.e. heated) prior to entering said fractionation tower such that the amount of fluid flowing down said tower is limited (Col 1, lines 63-69).

Regarding claim 11, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where said overhead product stream is substantially vapor (i.e. the majority of the overhead product stream is in the form of a vapor, Col 2, lines 35-40).

Regarding claim 12, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where the bottom product comprises natural gas liquids (Col 2, lines 26-34).

Regarding claims 15 and 16, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated

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above, where the input stream is heated by absorbing heat from said overhead product stream (via cross exchanger 41 (Col 2, lines 10-16)).

Regarding claim 19, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where said fractionation column comprises a plurality of vertically spaced trays, a packed column (i.e. packed bed), and a combination of trays and a packed column (Col 2, lines 17-25).

Regarding claim 21, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, further comprising a reboiler (16) that adds heat to a bottom reboil stream and reinjection said bottom reboil stream into said fractionation unit (Figure 1).

**10. Claims 5, 7, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rambo (US 5,114,451), Zahn (US 4,142,876), and further in view of Stone (US 6,510,706).**

Regarding claim 5, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above. However the reference does not indicate operating temperatures for said input stream.

Stone teaches a process for recovering NGL where a direct stream (10) is heated in a cross exchanger (13) where the temperature of said stream is increased from -139F to -101.2F (Column 4, table 2) in the process of condensing an overhead product stream (Col. 3, lines 3-5). While the heated temperature does not fall precisely within the range claimed by applicant, the general conditions disclosed by the reference occur within 14 degrees Fahrenheit. As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to operate a LNG recovery apparatus and method as disclosed by Rambo with the operating temperature as taught by Stone, since the claimed values are merely an optimum or workable range. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 7 and 13, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above. However the reference does not indicate operating temperatures for said overhead product stream.

Stone teaches a process for recovering LNG where an overhead product stream (20) exits a fractionation tower (15) with a temperature of -95.6F (Table 2) and said stream is subsequently cooled in a cross exchanger (13) by heating a direct stream (12), forming a cooled stream (21) with a temperature of -132.7F (Table 2). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to operate a LNG recovery apparatus and method as disclosed by Rambo in

combination with the operating temperatures as taught by Stone to condense an overhead product stream, providing a cold reflux stream, thereby increasing separation efficiency.

**11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rambo (US 5,114,451), Zahn (US 4,142,876), and further in view of McCartney (US 6,564,579).**

Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above. However the reference does not indicate operating temperatures.

McCartney teaches the use of heat exchangers (26 and 30) for vaporizing LNG streams and heating said streams to a range between 30F and 50F (Column 5, lines 60-64). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention to replace the vaporizer as disclosed by Rambo with the vaporizing heat exchanger as taught by McCartney to limit the amount of fluid the flowing down said tower.

**12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rambo (US 5,114,451), Zahn (US 4,142,876), and further in view of Wilkinson (US 2003/0005722).**

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Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, where a bottom product stream exits the bottom of a fractionation tower. However the reference does not indicate operating temperatures.

Wilkinson teaches the liquid product stream (41) at the bottom of the fractionation tower as 115F (Paragraph 37). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to operate a LNG recovery apparatus and method as disclosed by Rambo in combination with the operating temperatures as taught by Wilkinson since the claimed values are merely an optimum or workable range. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

**13. Claims 4, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rambo (US 5,114,451), Zahn (US 4,142,876), and further in view of Keller (US 2003/0005698).**

Regarding claim 4, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above with a liquefied natural gas input stream. However the reference does not indicate the temperature of said input.

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Keller teaches a system for vaporizing liquefied natural gas where the system inlet temperature is -249F (Paragraph 37). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to operate a LNG recovery apparatus and method as disclosed by Rambo in combination with the operating temperatures as taught by Keller, since the claimed values are merely an optimum or workable range. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 22, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, further comprising a reboiler. However, the reference does not specify the type of reboiler used.

Keller teaches a submerged combustion vaporizer (SCV). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to replace the reboiler disclosed by Rambo with a SCV reboiler as taught by Keller to allow for improved separation in the fractionation unit.

Regarding claim 23, Rambo discloses a method, apparatus, and system for recovery of liquefied natural gas liquids from liquefied natural gas as indicated above, further comprising a reboiler. However the references do not specify a heat source.

Keller teaches a submerged combustion reboiler that burns a portion of the LNG stream to vaporize said stream (Paragraph 7). As a result, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to Replace the reboiler disclosed by Rambo with a submerged combustion vaporizer as taught by Keller, to vaporize a portion of a LNG feed stream for reboiling.

### ***Response to Arguments***

14. Applicant's arguments were fully considered but are moot in view of a new ground(s) of rejection. The original rejection, particularly Wilkinson (US 2003/0005722) as modified by Bowen (US 2003/0014995), could not be reasonably maintained. A second non-final action is provided, as a result.

With regard to the arguments drawn to provisional double patenting, applicant's arguments are not persuasive. The co-pending applications are sufficiently similar in nature such that the claims partially overlap in scope.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Milios (US 6,964,181) discloses LGL and LNG recovery from LNG.

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Reddick (US 6,604,380) discloses LNG processing.

Campbell (US 5,881,569) discloses hydrocarbon gas processing.

Randall (US 3,702,541) discloses cryogenic separation of natural gas.

Yoshida (US 2005/0218041) discloses an apparatus and method for separating an inlet stream of LNG.

Schroder (US 6,907,752) discloses LNG recovery.

Key (US 6,311,516) discloses C3 recovery.

Prim (US 7,069,743) discloses recovery of C2 liquids from LNG.

Rhoades (US 5,359,856) discloses purifying LNG.

Dunbar (US 5,916,260) discloses LNG liquefaction.

Price (US 6,367,286) discloses LNG separation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON THOMPSON whose telephone number is (571)270-1852. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Swann can be reached on 571-272-7075. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JNT

/J J Swann/  
Supervisory Patent Examiner, Art  
Unit 3785

9/30/2011